

$$1. f(x) = \frac{\cancel{3x-2}}{\cancel{9-x}}$$

$$9 - x = 0$$

$$\swarrow + x$$


---


$$9 = x$$

$$(-\infty, 9) \cup (9, \infty)$$

$$\checkmark$$

$$2. f(x) = \frac{\cancel{x+10}}{\cancel{x^2-16}}$$

$$x^2 - 16 = 0$$

$$\swarrow + 16$$


---


$$\sqrt{x^2} = \sqrt{16}$$

$$x = -4, 4$$

$$(-\infty, -4) \cup (-4, 4) \cup$$

$$\checkmark (4, \infty)$$



3.  $\frac{9-x^2}{x-3}$

$\frac{(3-x)(3+x)}{x-3}$

$-1(3+x)$

4.  $\frac{x^3+4x^2}{x^2+2x-8}$

$\frac{x^2(x+4)}{(x+4)(x-2)}$

$\frac{x^2}{x-2}$  ✓



$$5. \frac{9x}{y^2} \cdot \frac{5y}{4x} \quad \frac{45}{4y} \quad \checkmark$$

$$6. \frac{x^2-9}{x^2-2x-3} \cdot \frac{x+1}{x}$$

$$\frac{(x-3)(x+3)}{(x-3)(x+1)}$$

$$\frac{x+1}{x}$$

$$\frac{x+3}{x} \quad \checkmark$$



$$7. \frac{x^2+11x+24}{x-9} \div \frac{x^2+2x-3}{x-9}$$

$$\frac{x^2+11x+24}{x-9}$$

*(Note: The numerator  $x^2+11x+24$  is circled in red in the original image, with '8' and '3' written above it.)*

$$\frac{x-9}{x^2+2x-3}$$

$$\frac{(x+8)(x+3)}{x-9}$$

*(Note: The original image shows blue arrows indicating the cancellation of (x+3) between the numerator and denominator.)*

$$\frac{x-9}{(x+3)(x-1)}$$

*(Note: The original image shows the (x-9) terms canceling out.)*

$$\frac{x+8}{x-1}$$

✓



$$8. \frac{x+5}{x-8} + \frac{4x+6}{x-8} = \frac{5x+11}{x-8} \quad \checkmark$$

$$9. \frac{11x+14}{x^2-10x+24} - \frac{10x+18}{x^2-10x+24}$$

$$= \frac{x-4}{x^2-10x+24}$$

$\frac{x-4}{\cancel{x-4}(x-6)}$   
 4 6

$$\checkmark \frac{1}{x-6}$$



$$10. \frac{7x+8}{x^2-12x+27} - \frac{6x+11}{x^2-12x+27} =$$

$$\frac{x-3}{x^2-12x+27}$$

$$\frac{\cancel{x-3}}{(x-9)\cancel{(x-3)}}$$

$$\frac{1}{x-9}$$



$$11. \frac{1}{x} + \frac{2}{5x^2} = \frac{5x + 2}{5x^2} \quad \checkmark$$

$$12. \frac{3}{x} - \frac{4}{x} = \frac{3 - 4x}{x} \quad \checkmark$$



$$13. \frac{7}{x^2+5x-6} - \frac{3}{x-1}$$

$$(x+6)(x-1)$$

$$\begin{array}{r} -3x-18 \\ \hline 7-3(x+6) \end{array}$$

$$(x+6)(x-1)$$

$$\begin{array}{r} -11-3x \\ \hline (x+6)(x-1) \end{array}$$





14.  $\frac{w-8}{3} = \frac{w}{7}$

$$3w = 7w - 56$$

$$-7w$$

---

$$-4w = -56$$
$$\swarrow \quad \swarrow$$
$$-4 \quad -4$$

$$w = 14 \quad \checkmark$$



$$15. \frac{6x}{x+2} - 6 = \frac{x-23}{x-2}$$

$$\frac{6x(x-2)}{x+2(x-2)} - \frac{6(x+2)(x-2)}{(x+2)(x-2)} = \frac{x-23(x+2)}{x-2(x+2)}$$

$$6x(x-2) - 6(x^2 - 2x + 2x - 4) = (x^2 + 2x - 23x - 46)(x+2)$$

$$\cancel{6x^2} - 12x - \cancel{6x^2} + 24 = x^2 - 21x - 46 + 12x - 24$$

$$x^2 - 9x - 70$$



$$x^2 - 9x - \frac{70}{14} 3$$

$$(x - 14)(x + 5)$$

↓

$$x = 14$$

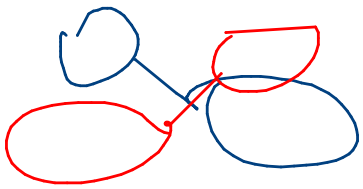
✓

↓

$$x = -5$$

✓





$$a^2 - 5a = -6a + 12$$

$$+6a - 12$$

$$a^2 + a - 12$$

$$(a + 4)(a - 3)$$

$$a = -4 \quad a = 3$$



$$\frac{(x-2)}{(x+5)} \cdot \frac{x+1}{x+5} = \frac{x^2-27x}{x^2+3x-10} - \frac{x-5}{x-2} \quad \begin{matrix} (x+5) \\ (x+5) \end{matrix}$$

$$\frac{x^2-2x+1x-2}{(x-2)(x+1)} = x^2-27x - \frac{x^2+3x-5x-25}{(x-5)(x+5)}$$

$$x^2 - x - 2 = \cancel{x^2} - 27x - \cancel{x^2} + 15$$

$$+26x - 25$$

$$x^2 + 26x - 27$$



$$x^2 + 26x - 27$$

$$(x + 27)(x - 1)$$

↓                      ↓

$$x = -27 \quad x = 1$$



18. One-third equals the quotient of a number and 24. Find the number.

Frac

$$\frac{1}{3} = \frac{x}{24}$$

$$\frac{3x}{3} = \frac{24}{3}$$

$$x = 8$$



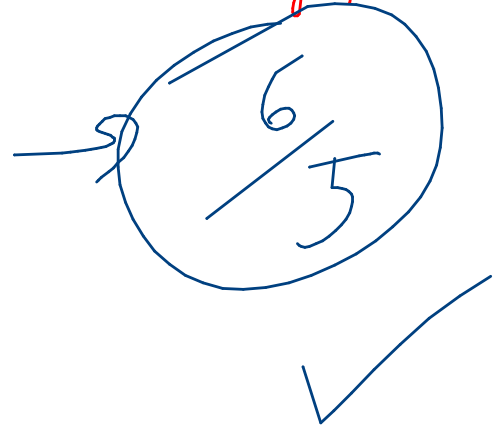
19. It takes a mom 3 hours to weed a large flower bed in her yard. Her daughter can weed the same area in 2 hours. If the two work together, find how long it will take them to complete the job.

Fraction

Add

Reciprocal

$$\frac{1}{3} + \frac{1}{2} = \frac{2}{6} + \frac{3}{6} = \frac{5}{6}$$

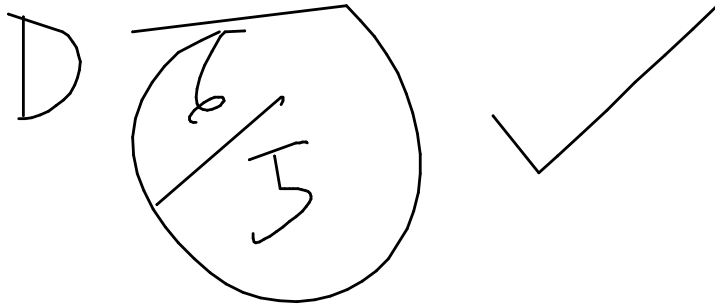




19. It takes a mom 3 hours to weed a large flower bed in her yard. Her daughter can weed the same area in 2 hours. If the two work together, find how long it will take them to complete the job.

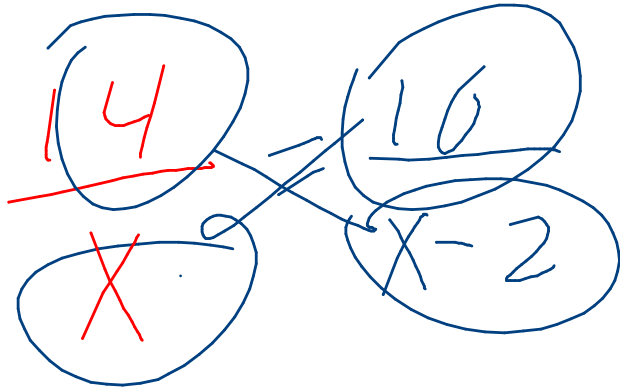
$$M \quad 3 \times 2 = 6$$

$$A \quad 3 + 2 = 5$$





20. A jogger begins his workout by jogging to the park, a distance of 14 miles. For his cool down, he jogs along a different route that is 10 miles long and reduces his speed by 2 miles per hour. Each portion of the workout took the same time. Find the jogger's speed during the first portion and find his speed during the cool down portion.



$$\begin{array}{r} 10X = 14X - 28 \\ -14X \quad \leftarrow \\ \hline -4X = -28 \\ \quad \swarrow \quad \searrow \\ \quad -4 \quad \quad -4 \end{array}$$

$$X = 7$$

$$7 - 2 = 5$$



$$21. \quad \frac{\cancel{x}3 - \frac{7}{\cancel{x}}}{\cancel{6x} + \frac{7}{8x}} = \frac{\cancel{x}3x - 7}{\cancel{x}8x^2 - 7}$$

$$\frac{3x - 7}{8x}$$

$$\frac{3x - 7}{\cancel{x}}$$

$$\frac{\cancel{8x}}{8x^2 - 7}$$

$$\frac{8(3x - 7)}{8x^2 - 7}$$





22.  $\frac{7x + \frac{2}{x^2}}{\frac{y}{x^2}}$

$$\begin{array}{r} 7x + 2 \\ \hline x^2 \\ \hline y \\ \hline x^2 \end{array}$$



$$\begin{array}{r} 7x + 2 \\ \hline \cancel{x^2} \end{array} \cdot \frac{\cancel{x^2}}{y}$$

$$\frac{7x + 2}{y}$$